

**Implementation of
ISO/IEC 9541-1:1991**

Information technology — Font information interchange —

Part 1: Architecture

UDC 681.3:655.24

National foreword

This British Standard is the UK implementation of ISO 9541-1:1991+A4:2009, incorporating corrigenda October 1992, July 1994 and July 1995. It supersedes BS ISO/IEC 9541-1:1991 which is withdrawn.

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The UK participation in its preparation was entrusted to Technical Committee IST/41, Document description and processing language.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Information Systems Technology Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 20 December 1991

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The following BSI references relate to the work on this standard:
Committee reference IST/18
Draft announced in *BSI News* August 1990

ISBN 978 0 580 69382 3

Amendments/corrigenda issued since publication

Amd. No.	Date	Comments
7571 (Corr.)	February 1993	Implementation of ISO/IEC corrigendum October 1992
8420 (Corr.)	April 1995	Implementation of ISO/IEC corrigendum July 1994
8920 (Corr.)	November 1995	Implementation of ISO/IEC corrigendum July 1995
	31 October 2009	Implementation of ISO/IEC amendments 1:2001, 2:1998, 3:2000 and 4:2009

INTERNATIONAL STANDARD

ISO/IEC
9541-1

First edition
1991-09-15

Information technology — Font information interchange —

Part 1: Architecture

*Technologies de l'information — Échange d'informations sur les
fontes —*

Partie 1: Architecture



Reference number
ISO/IEC 9541 1:1991 (E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9541-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9541 consists of the following parts, under the general title *Information technology — Font information interchange*:

- *Part 1: Architecture*;
- *Part 2: Interchange Format*;
- *Part 3: Glyph shape representation*;
- *Part 4: Application-specific requirements*.

Part 1 of ISO/IEC 9541 specifies the architecture of a font resource, i.e., the font description, font metrics, glyph description and glyph metrics properties required for font references and the interchange of font resources.

Part 2 of ISO/IEC 9541 specifies the interchange formats for font information, and the minimum subsets of that information required for interchange.

Part 3 of ISO/IEC 9541 specifies the architecture and interchange formats for glyph shape representations.

Part 4 of ISO/IEC 9541 specifies the architecture and interchange format extensions for application specific (e.g. typesetting of mathematics) requirements.

Annex A forms an integral part of this part of ISO/IEC 9541. Annex B is for information only.

Introduction

The use of open networks for the interchange of documents in both office and publishing environments has shown the need for a mechanism enabling the interchange of font information.

It is foreseen that publishing and office technologies will merge and that this development will be facilitated by definition of a standard font resource architecture and a limited number of standard font resource interchange formats.

1 Scope

ISO/IEC 9541 defines a method of naming glyphs and glyph collections, independent of any document encoding technique; it assumes that one or more methods of associating document encoding techniques with glyph identifiers used in font resources will be provided by text processing systems.

This part of ISO/IEC 9541 specifies the architecture of a font resource, i.e., the font description, font metrics, glyph description and glyph metrics properties required for font references and the interchange of font resources.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9541. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9541 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 646:1983, *Information processing — ISO 7-bit coded character set for information interchange*.

ISO 3166:1988, *Codes for the representation of names of countries*.

ISO 6523:1984, *Data interchange — Structures for the identification of organizations*.

ISO 8824:1990, *Information technology — Open Systems Interconnection — Specification of Abstract Syntax Notation One (ASN.1)*.

ISO/IEC 9070:1991, *Information technology — SGML support facilities — Registration procedures for public text owner identifiers*.

ISO/IEC 9541-2:1991, *Information technology — Font information interchange — Part 2: Interchange Format*.

ISO/IEC 10036:—, *Information technology — Procedure for registration of glyph and glyph collection identifiers*¹⁾.

3 Definitions

For the purposes of this part of ISO/IEC 9541, the following definitions apply.

3.1

alignment line

imaginary line to which most glyph images of a font seem to align

3.2

current position

a point on the presentation surface at which the next glyph representation is to be imaged

3.3

design size

absolute size at which a font is designed to be used

3.4

escapement

movement of the current position on the presentation surface after a glyph representation is imaged

¹⁾ To be published.

3.5

escapement point

a glyph metric; a point in the glyph coordinate system, to which the current position on the presentation surface is usually translated, after the glyph representation is imaged

3.6

font

a collection of glyph images having the same basic design, e.g., *Courier Bold Oblique*

3.7

font family

a collection of fonts of common design, e.g., *Courier*, *Courier Bold*, *Courier Bold Oblique*

3.8

font metrics

the set of dimensions and positioning information in a font resource common to all glyph representations contained in that font resource

3.9

font reference

the information about a font resource in an electronic document representation, and possible procedures and operations on that information, which identify or describe the desired font

3.10

font resource

a collection of glyph representations together with descriptive and font metric information which are relevant to the collection of glyph representations as a whole

3.11

font size

a scalar reference size relative to which most font metrics, glyph shapes and glyph metrics are specified

3.12

glyph

a recognizable abstract graphic symbol which is independent of any specific design

3.13

glyph collection

an identified set of glyphs

3.14

glyph coordinate system

a two-dimensional Cartesian coordinate system within which glyph shapes, glyph metrics, and font metrics are defined

3.15

glyph image

an image of a glyph, as obtained from a glyph representation displayed on a presentation surface

3.16

glyph metrics

the set of information in a glyph representation used for defining the dimensions and positioning of the glyph shape

3.17

glyph representation

the glyph shape and glyph metrics associated with a specific glyph in a font resource

3.18

glyph shape

the set of information in a glyph representation used for defining the shape which represents the glyph

3.19

kern

the extension of a glyph shape beyond its position point or escapement point

AC2 3.20

naming authority

a portion of a hierarchical naming tree that unambiguously identifies an organizational entity responsible for naming **AC2**

3.21

position point

a glyph metric; a point in the glyph coordinate system, usually translated to the current position on the presentation surface before the glyph shape is imaged

3.22

posture

the extent to which the shape of a glyph or set of glyphs appear to incline, including any consequent design or form change

3.23

presentation surface

a virtual representation of a presentation medium (page, graphics display, etc.), maintained by the presentation process, on which all glyph shapes are to be imaged

3.24

proportionate width

the ratio of a glyph's or set of glyphs' escapement to font height

3.25

stem

the major stroke of a glyph shape

3.26

weight

the ratio of a glyph's or set of glyphs' stem width to font height

3.27

writing mode

an identified mode for setting of text in a writing system, usually corresponding to a nominal escapement direction of the glyphs in that mode, i.e., left-to-right, right-to-left or top-to-bottom

A2 3.28 body size

font size, measured along the y axis of the glyph coordinate system.

3.29 extended body size

reference size with two components, measured respectively along the x and y axes of the glyph coordinate system

3.30 design frame

dimensional expression that specifies the area inside which a set of glyph images can be designed

3.31 bounding box

dimensional expression to specify an actual area that a glyph image occupies within a design frame

3.32 blackness

ratio of the blackened area of a glyph image to the extended body size area of the glyph image **A2**

A3 3.32

interlinear object

Object between lines or objects inserted between lines.

3.33

intercharacter object

object between characters in the writing direction, which is the direction specified by WRMODENAME.

3.34

parent object

object with which an interlinear or intercharacter object is associated. This term is used when referring to the relationship between an interlinear/intercharacter object and the object with which the interlinear/intercharacter object is associated.

3.35

child object

interlinear or intercharacter object. This term is used when referring to the relationship between an interlinear/intercharacter object and the object with which the interlinear/intercharacter object is associated. **A3**

A4 3.36

typeface class

classification of typefaces for font referencing

3.37

kind

application field (text, handwritten, decorative, symbol) of font for font referencing

3.38

serifstyle

shape (cove, normal sans, rounded, no classification) of serif for font referencing **A4**

4 Notation

An extended version of Backus-Naur Form (BNF) notation is used to formally define the data types used throughout this part of ISO/IEC 9541 in a manner independent of the actual abstract data syntax used in the font interchange formats. By convention, basic data types are shown in uppercase.

The components of the extended BNF are:

aaa	rule syntactic element
::=	rule definition
	element choice (or)
,	element separator
AC1 [...]	optional element(s) AC1
(...)	group of elements
(...)*	0 to n repeat of element(s) in group
(...)+	1 to n repeat of element(s) in group
“ ... ”	literal element
— ...	comment
AC2 &	unordered conjunction (and) AC2

EXAMPLES:

- a) **$a ::= b, c$** : Element *a* is defined as/composed of the sequence of element *b* followed by element *c* (ordered list);
- b) **$a ::= b | c$** : Element *a* is defined as either of the elements *b* or *c*;
- c) **$a ::= (b | c), [d]$** : Element *a* is defined as the sequence of containing either of the elements *b* or *c*, optionally followed by the element *d*;
- d) **$a ::= (b | c)^*$** : Element *a* is defined as a sequence of 0 or more instances of either of the elements *b* or *c*;
- e) **$a ::= (b, c, \text{“foo”})^+$** : Element *a* is defined as a sequence of 1 or more instances of the sequence of the elements *b*, *c* and the literal “foo”;
- [AC₂] f) $a ::= (b \& c \& [d])$** : Element *a* is defined as the sequence of *b* and *c* and *d* occurring in any order, where *d* is optional.

The formal data type definitions given in clause 8 identify the set of information that may be represented by all font information interchange formats that conform to this part of this International Standard. There is no requirement that an interchange format follow the exact organization of data or structures represented in clause 8, as long as the general architectural principles of extensibility, backward and forward compatibility are not compromised. Each conforming interchange format is free to adopt the most efficient encoding mechanism available in its abstract syntax, and to place limits (not provided for in the BNF notation) on the frequency of property occurrence. AC₂

In particular, the actual names of properties and property-lists defined in ISO/IEC 9541 do not have to be encoded directly as data in an interchange format as long as the association between the names and values is maintained.

The fully qualified name of a property or property-list is given by the BNF definition of the structured property name for each property defined in clause 8. It is up to the parsing processes to expand the encoding-specific names into these fully qualified names for use by encoding-independent interfaces.

5 Data types

5.1 General

An elemental data type defines the basic unit of information represented in a font resource for which there is no further part 1 subdivision. A complex data type is a grouping of elemental data types which are used as basic building blocks.

This clause defines the elemental and complex data types used throughout this part of ISO/IEC 9541. The formal syntax and method of encoding these data types are defined in the font information interchange format specified in ISO/IEC 9541-2.

5.2 Properties and property-lists

The principal data type used to represent font resource information is a property. Conceptually, a property is defined to be a *name type value* tuple, where: *name* is the unambiguous property name; *type* is the data type of the property value; and *value* is the value of the property, the meaning and interpretation of which is specified by the property name and the context in which the property is used.

The font resource properties specified in clause 8 of ISO/IEC 9541 include precise definitions of data type. As a result, the property name is also a specification of the data type and meaning of the corresponding property value. The data type of non-ISO properties, however, shall be explicitly defined using the elemental and complex data types defined in this clause.

For example, a property for identifying the font family name used in a font resource might have a property name FONTFAMILY, whose value is defined to be of data type *name*, where a particular property value instance might be *Courier*.

Properties may be grouped together according to the class of object they are associated with into property-lists. A property-list is a set of zero or more properties of an object, all with property names of the same class. Often a class of property names is created specifically for the purpose of naming the objects in a particular type of property-list. For example, the property names WEIGHT and POSTURE might belong to the class of font resource property names created specifically to name descriptive font resource properties.

The value of a property may be itself a property-list (i.e., the data type is *property-list*) so that one property-list is effectively nested inside another. In general, this nesting may be repeated indefinitely, so as to permit creation of arbitrarily complex hierarchical data structures. In practice, however, the depth of nesting is usually restricted according to the context in which a particular property is defined.

Property-lists, ordered or unordered as appropriate, allow for the definition and general extensibility of both ISO and non-ISO font resource data. A non-ISO property is any font resource property not defined by ISO/IEC 9541.

5.3 Values and value-lists

Each property has an associated value. A value may be terminal, i.e., it represents a simple data type such as integer, it may be a list of values of such simple data types (a value-list), or it may be itself a property-list.

As opposed to property-lists, value-lists are used wherever the content of a property can be prescribed; ordered value-lists are used whenever the exact order of the property values can be prescribed.

The data types of each property value defined in a conforming font resource shall be specified to be one of the following:

5.3.1 property: A *name type value* tuple data structure;

5.3.2 property-list: A list of zero or more related properties, possibly the value of some other higher-level property, which may be specified to be ordered in a particular sequence;

5.3.3 value-list: A list of zero or more property *type value* pairs, each usually of the same data type, which may be specified to be ordered in a particular sequence;

5.3.4 proprietary-data: A data structure containing binary information that is not representable by data types defined in this part of ISO/IEC 9541. Such information is usually proprietary in nature, and is often protected by legal contract. It may be exchanged but will not be necessarily understood by all users of the font resource. Proprietary data contains:

- optional message (usually giving a data copyright notice);
- optional encryption key;
- n bytes of arbitrary binary data, optionally encrypted according to the encryption key.

5.3.5 match-string: An ordered sequence of graphic character and possible character set control codes, of an identified character string universal class, as specified by ISO 8824, such string intended for matching;

5.3.6 message: An ordered sequence of graphic character and possible character set control codes, of an identified character string universal class, as specified by ISO 8824, which constitute a human understandable message suitable for presentation to a user;

5.3.7 octet-string: An ordered sequence of octets;

5.3.8 octet: An 8-bit byte;

5.3.9 integer: A signed integer number within the range -2^{31} to $2^{31} - 1$ inclusive;

5.3.10 cardinal: An unsigned integer number within the range 0 to $2^{32} - 1$ inclusive;

5.3.11 code: A cardinal within the range 0 to $2^8 - 1$ inclusive;

5.3.12 rational: A signed rational number expressed as the ratio of two integers, i.e., a *numerator/denominator*. The denominator is within the range 1 to $2^{31} - 1$ inclusive;

5.3.13 rel-rational: A rational number expressed relative to the glyph coordinate system unit divisor;

5.3.14 angle: A rational number in degrees, within the range 0 inclusive to ± 360 exclusive, rotated counter-clockwise around the origin of the glyph coordinate system, as measured from the positive x axis;

5.3.15 structured-name: A structured-name, see 5.4;

5.3.16 boolean: A boolean value, one of TRUE or FALSE.

5.4 Structured-names

[AC3] The main vehicle for naming used in ISO/IEC 9541 is a structured-name. **[AC3]** A structured-name is an unambiguous identifier for some object suitable for representing that object within a decentralized, distributed computer system, invariant over space and time. **[AC3]** The architecture of structured-names is defined in ISO/IEC 9070 and the interchange formats for structured-names are defined in Annex B of ISO/IEC 9541-2:1991. **[AC3]**

The remainder of this clause defines the application of $\overline{\text{AC}_3}$ ISO/IEC 9070 $\overline{\text{AC}_3}$ to structured-names as used in ISO/IEC 9541. For notational convenience in ISO/IEC 9541, a structured-name is notated in the canonical form defined in ISO/IEC 9070:1991.

5.4.1 ISO/IEC 9541 and ISO/IEC 10036 names

ISO/IEC 9541 names are those structured-names with naming authority in the canonical form of “ISO/IEC 9541-1”. All ISO/IEC 9541 names are reserved for definition by this part of ISO/IEC 9541. Examples include the font resource properties defined in clause 8 of this part. Portions of the structured-name may be omitted from ISO/IEC 9541 names where context establishes the fully qualified name, thereby leaving only the property name to be interchanged.

NOTE 1 The ASN.1 form of this naming authority is {1 0 9541 1}.

ISO/IEC 10036 names are those structured-names with naming authority in canonical form “ISO/IEC 10036/RA”. All ISO/IEC 10036 names are reserved for definition by registries specifically authorized by ISO/IEC 10036. Examples include the glyph names and registry thereof defined in clause 6 of this part of ISO/IEC 9541. Portions of the structured-name may be omitted from structured ISO/IEC 10036 names where context establishes the fully qualified name, thereby leaving only the glyph or glyph collection name(s) to be interchanged.

NOTE 2 The ASN.1 form of this naming authority is {1 1 10036}.

The textual content of ISO/IEC 9541 names and ISO/IEC 10036 names contained in conforming font resources shall be encoded according to the ISO 646 IRV coded character set.

NOTE 3 The character repertoire of ISO/IEC 9541 names and ISO/IEC 10036 names is defined in ISO/IEC 9541-2, Annex B.

NOTE 4 ISO/IEC 9541 names and ISO/IEC 10036 names are so reserved as to provide a set of structured-names which are most widely recognized and supported, while still allowing a distributed naming capability to those who wish to use it. Particular classes of font-related objects and names are defined in the appropriate clauses of this part of ISO/IEC 9541 and in accordance with ISO registration procedures.

NOTE 5 While structured property names, structured glyph collection names and structured glyph names other than those registered as ISO/IEC 9541 or ISO/IEC 10036 names, respectively, are generally supported by the architecture defined here, their meaning is not defined by ISO/IEC 9541.

5.4.2 ICD0010 names

ICD0010 names are those structured-names created by organizations registered with naming authority “ICD0010”, whose organizational codes shall consist solely of numbers. All ICD0010 names are reserved for definition by registries specifically authorized by a type industry professional organization naming authority operating under ISO 6523 and having ICD value 0010 in its SIO.

NOTE 6 The ASN.1 form of this naming authority is {1 3 10}.

It is recommended, although not required, that the ICD0010 naming authority be used to register organizations wishing to create registries of font resource information for the purposes of font information interchange. For example, for organization XYZ to create the font resource name “ICD0010/1234//FontNames::Garamond-Bold-Italic-Condensed”, the object name naming authority 1234 must be issued by naming authority ICD0010 to organization XYZ.

5.5 Formal notation

The formal definition for ISO/IEC 9541 data types is given by the following BNF notation:

```
property ::= property-name, [property-type,] property-value
property-name ::= STRUCTURED-NAME
property-type ::= -- coded ISO/IEC 9541 data type identifier, one of:
    property-list, ordered-property-list,
    value-list, ordered-value-list, BOOLEAN,
    STRUCTURED-NAME, MATCH-STRING, MESSAGE,
    OCTET-STRING, OCTET, INTEGER, CARDINAL, CODE,
    RATIONAL, REL-RATIONAL, ANGLE, PROPRIETARY-DATA
property-value ::= value | complex-value
complex-value ::= value-list | ordered-value-list |
    property-list | ordered-property-list
value-list ::= (value) * -- unordered
ordered-value-list ::= (value) * -- ordered
property-list ::= (property) * -- unordered
ordered-property-list ::= (property)* -- ordered
value ::= BOOLEAN | STRUCTURED-NAME |
    MATCH-STRING | MESSAGE | OCTET-STRING |
    OCTET | INTEGER | CARDINAL | CODE | RATIONAL |
    REL-RATIONAL | ANGLE | PROPRIETARY-DATA
BOOLEAN ::= -- a boolean value, one of TRUE or FALSE
STRUCTURED-NAME ::= -- see 5.4
MATCH-STRING ::= -- An ordered sequence of graphic character and possible character set control
    codes, of an identified character string universal class, as specified by ISO 8824,
    intended for matching
MESSAGE ::= -- An ordered sequence of graphic character and possible character set control codes, of
    an identified character string universal class, as specified by ISO 8824, intended for
    presentation to a user
OCTET-STRING ::= (OCTET) *
OCTET ::= -- 8-bit byte
INTEGER ::= -- a signed integer number,  $-2^{31}$  to  $2^{31} - 1$  inclusive
CARDINAL ::= -- an unsigned integer number, 0 to  $2^{32} - 1$  inclusive
CODE ::= -- a coded, unsigned integer number, 0 to  $2^8 - 1$  inclusive
RATIONAL ::= numerator, [denominator] -- denominator defaults to 1
REL-RATIONAL ::= numerator, [denominator] -- denominator defaults to value of glyph
    coordinate system unit divisor or 1 if that divisor is not defined
ANGLE ::= numerator, [denominator] -- an angle, in degrees, 0 to  $\pm 360$  exclusive, rotated
    counter-clockwise around the origin of the glyph coordinate system, as measured from the
    positive x axis
PROPRIETARY-DATA ::= [proprietary-data-message,]
    [proprietary-data-key,]
    proprietary-data-blackbox
```

numerator ::= -- a signed integer number, -2^{31} to $2^{31} - 1$ inclusive

denominator ::= -- a signed integer number, 1 to $2^{31} - 1$ inclusive

proprietary-data-message ::= MESSAGE

proprietary-data-key ::= OCTET-STRING

proprietary-data-blackbox ::= OCTET-STRING

6 Glyph identification

6.1 General

Glyphs are distinguished by their design-independent shape and their description (e.g., “||” — double bracket, open, piece extender; “|” — center box bar, double vertical). In the general case, glyphs are identified by a structured glyph name, according to the definition of structured-names in clause 5. For example, “ICD0010/1234//A” or “ICD0010/1234//789” might be a name for the capital Latin “A” glyph, at the discretion of naming authority XYZ.

This method of naming is not intended to establish any particular encoding for strings of glyph names, particularly not an encoding where the complete structured glyph name including the registered naming authority object identifier must be encoded for every glyph.

When referencing glyphs with intersecting descriptions, users are generally advised to use the most specific appropriate glyph available in order to maintain unique glyph identification. For example, use *hyphen* rather than *hyphen-minus* if hyphen is intended.

6.2 ISO/IEC 10036 glyph names

ISO/IEC 10036 glyphs are those glyphs named by structured-names for which the owner name identifies the registration authority authorized by ISO/IEC 10036. ISO/IEC 10036 glyph identification has the objective of generating a unique, unambiguous glyph identifier for each glyph defined and used in the world. These glyph identifiers are to be distinct for each combination of glyph shape and description, but will not be different for each design variation. This establishes a structure and registry for identification of ISO/IEC 10036 glyphs.

AC₂ ISO/IEC 10036 glyphs are identified by structured names for which the equivalent canonical character string form is “ISO/IEC 10036/RA//Glyphs::nnnn”, where “ISO/IEC 10036/RA” is the Owner Name, “Glyphs” is the first Object Name Component of the Object Name, and “nnnn” is a sequence of decimal digits beginning with a non-zero digit, which represents an integer in the range of 1 to $2^{32} - 1$. AC₂

6.3 ISO/IEC 10036 glyph registration authority

For the purposes of ISO/IEC 9541 and according to the rules for the designation and operation of registration authorities in the ISO/IEC JTC1 Directives, the ISO and IEC Councils shall designate an organization to act as the ISO/IEC 10036 glyph registration authority. The name and address of the registration authority and the registration procedures are to be found in ISO/IEC 10036.

7 Glyph collection identification

7.1 General

A glyph collection is an identified set of glyphs, defined by enumeration of the structured-names of the glyphs in the collection. In the general case, glyph collections are identified by a structured glyph collection name, according to the definition of structured-names in 5.4. For example, “ICD0010/1234//WesternEuropean” or “ICD0010/1234//6789” might be a name for the Western European glyph collection, at the discretion of naming authority XYZ.

Some or all of the glyphs of a collection might or might not be ISO/IEC 10036 glyphs. However, wherever practical, users are advised to use ISO/IEC 10036 glyphs in defining collections. Further, the structured glyph collection name might or might not be an ISO-registered name. However, wherever practical, users are advised to use ISO/IEC 10036 glyph collections, and composite collections based on ISO/IEC 10036 glyph collections and ISO/IEC 10036 glyphs.

7.2 ISO/IEC 10036 glyph collection names

ISO/IEC 10036 glyph collections are those glyph collections named by structured-names for which the owner name identifies the registration authority authorized by ISO/IEC 10036. ISO/IEC 10036 glyph collections shall consist solely of ISO/IEC 10036 glyphs. Definition of ISO/IEC 10036 glyph collections has the objective of establishing a relatively few widely recognized collections which serve as the basis for efficient generation and use of fonts. The remainder of this clause establishes a structure and registry for identification of ISO/IEC 10036 glyph collections.

[AC₂] ISO/IEC 10036 glyph collections are identified by structured names for which the equivalent canonical character string form is “ISO/IEC 10036/RA/Collections::nnnn”, where “ISO/IEC 10036/RA” is the Owner Name, “Collections” is the first Object Name Component of the Object Name, and “nnnn” is a sequence of decimal digits beginning with a non-zero digit, which represents an integer in the range of 1 to $2^{32} - 1$. **[AC₂]**

7.3 ISO/IEC 10036 glyph collection registration authority

For the purposes of ISO/IEC 9541 and according to the rules for the designation and operation of registration authorities in the ISO/IEC JTC1 Directives, the ISO and IEC Councils shall designate an organization to act as the ISO/IEC 10036 glyph collection registration authority. The name and address of the registration authority and the registration procedures are to be found in ISO/IEC 10036.

8 Font resource

8.1 General

A font resource is composed of an arbitrary number of ISO and non-ISO font properties and is unambiguously identified by its device-independent font resource name. The properties of a font resource are defined by a property-list whose property names are structured font resource property names. For example, CAPHEIGHT might be a font resource property name whose corresponding value is a distance in the glyph coordinate system. **[AC₂]** At the discretion of the font resource supplier, the same font resource name may be assigned to multiple font resources which are equivalent (e.g., containing corrections or additions which do not impact the compatibility of the resource). **[AC₂]**

The font resource data structure groups writing-mode-dependent properties into sets of values on a per-writing-mode basis, referred to as *modal properties*. Most glyph and font metrics are specified as modal properties. A font resource may also contain a set of descriptive properties, referred to as *description properties*, that describe the glyph representations of the resource globally, independent of a particular writing mode. Glyph shape-specific information is grouped into a set of shape properties, referred to as *glyph shape representation properties* (see ISO/IEC 9541-3).

The structure of a font resource is as follows (where indentation denotes structure nesting):

- Font resource name property
- Description property-list
- Modal property-list
 - Writing mode property-list(s)
 - Glyph metrics property-list(s)
 - Glyph shape representations property-list(s)

While a particular instance of a font resource may contain all the property-lists described above, it is not required to do so. Font suppliers, processing systems or applications may require that a font resource be partitioned into subsets for practical or contractual reasons. For the purposes of ISO/IEC 9541, however, a font resource is viewed conceptually as containing all the property-lists described above.

ISO/IEC 9541 font resource properties are those font resource properties with structured font resource property names having naming authority “ISO/IEC 9541-1”.

Within a font resource, a font resource definer should generally supply as many font resource properties as is practical, so that users can make fullest use of the resource.

The remainder of this clause defines the font resource description and modal properties, giving the type and meaning of the corresponding property values. Unless otherwise specified, all dimensions and locations are given in the glyph coordinate system independent of imaging device or shape representation technology.

NOTE 7 It is possible, although not advised, for an otherwise valid font resource to contain font resource property values which are inconsistent with other font resource property values. For example, it is possible for a font resource to contain a POSTURE property with a value of *italic* even though some or all of the glyphs in the font resource are in fact not of italic design.

8.1.1 *Font resource name*

The font resource name property specifies an unambiguous identifier to refer to all information contained in a particular font resource.

The font resource name property is specified in 8.5.

8.1.2 *Font resource description properties*

The description property-list contains those font resource properties that characterize the font resource as a whole, independent of writing mode, including such properties as font family, weight, posture, glyph complement, etc.

The description property-list is specified in 8.6, and is of general interest to font selection, substitution and document composition processes.

8.1.3 *Font resource modal properties*

The font resource architecture described here supports multiple writing modes, but has only one set of values for description properties and glyph shapes. Much of the font metric information is dependent upon writing mode. Therefore the structure of a font resource distinguishes which properties are writing-mode-dependent from those that are not, and provides for the identification of which property values are associated with which writing mode.

Font resource description and modal property-lists taken together are commonly referred to as the *metrics* of a font resource, and are of general interest to document composition processes. The modal properties are also used by presentation processes to position the glyph shape representations on the presentation surface.

8.1.3.1 *Writing mode properties*

The writing mode properties describe the limits and measures for the font resource according to a given writing mode.

The writing mode properties are specified in 8.7.

8.1.3.2 *Glyph metrics properties*

The glyph metrics property-list contains the glyph description and metrics information that give the extents, escapement and other measures for individual glyphs on a per-writing-mode basis.

The glyph metrics property-list is specified in 8.8.

8.1.4 *Glyph shape representation properties*

The glyph shape representation property-list contains the set of glyph shape representation and technology-specific information of the font resource, independent of writing mode.

The glyph shape representation property-list is specified in ISO/IEC 9541-3 and is of general interest to presentation processes.

8.1.5 *Formal data type definition of a font resource*

The formal data type definition of a font resource in BNF notation is given below:

```
fontresource ::= [fontname-property,]
                [fontdescription-property-list,]
                [wrmodes-property-list,]
                [shapes-property-list,]
                [property-list]
```

It is recommended, although not required, that non-ISO properties and property-lists be nested in one of the property-lists defined in ISO/IEC 9541 wherever possible.

Throughout the remainder of clause 8, the formal data type definition in BNF notation is given with each property and property-list defined in the clause.

8.2 Glyph coordinate system

Glyph shapes and metrics are defined with respect to a single two-dimensional Cartesian coordinate system, called the glyph coordinate system, with positive x axis pointing to the right and positive y axis pointing up. All directions, e.g., horizontal or vertical, are given here with respect to the glyph coordinate system, not the presentation surface or document coordinate system. Technology-specific shape descriptions may be defined with respect to a technology-specific shape coordinate system; such descriptions refer to the glyph coordinate system by appropriate specification of the relationship between the technology-specific shape coordinate system and the reference glyph coordinate system.

Font resource definers are strongly encouraged to follow the convention that, in the glyph coordinate system, glyphs are upright, i.e., what is usually the top of the glyph is oriented in the positive y direction.

Within the glyph coordinate system, dimensions are specified as a ratio to the body size of the glyph. Body size is a scalar reference size, often expressed as an integral number of unit sub-divisions equivalent to the x,y grid employed to digitize the font resource, relative to which most metric information of that font resource and its glyph shapes are specified. The glyph coordinate system, therefore, may be continuous or discrete, as indicated by the relative rational units divisor property, which specifies the number of relative rational units equal to the body size (see the RELUNITS) property, 8.6.7.

Distances are specified as unsigned ratios to the body size. Locations are specified as signed x and y coordinates, each coordinate a ratio to the body size, generally specified relative to the origin of the glyph coordinate system. See Figure 1.

NOTE 8 The sizes of typographic fonts are traditionally specified in terms of body size, by height measured in printing points or millimeters, so that dimensions may naturally be specified relative to their body size. For fonts whose sizes are not normally specified in terms of body size, e.g., office fonts whose size is usually given in terms of horizontal pitch, the font resource definer must assign some reasonable body size relative to which dimensions may then be specified in the glyph coordinate system; for example, the font Courier 10 pitch, being usually printed 6 lines to the inch, might be assigned a body size equivalent to 1/6 inch for this purpose.

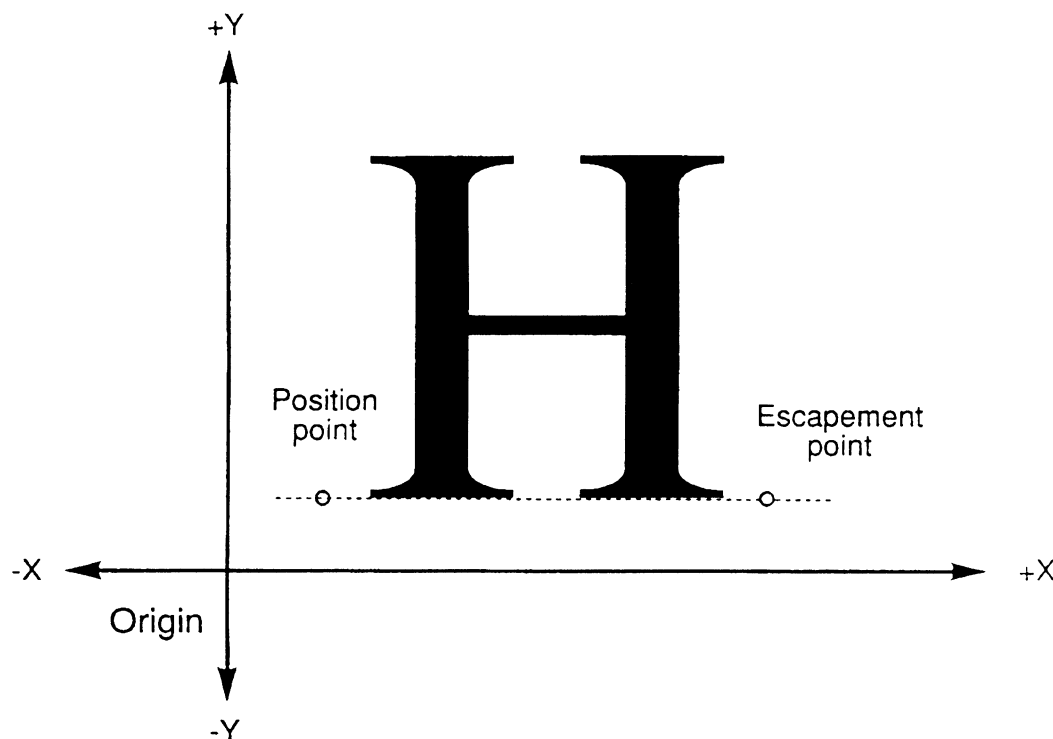


Figure 1 — Glyph coordinate system showing a typical Latin glyph in the LEFT-TO-RIGHT writing mode

8.3 Linear scaling model

A fundamental aspect of the font model described in ISO/IEC 9541 is the ability to apply linear geometric transformations to metric and shape representation information contained in a font resource.

Positions and distances in the glyph coordinate system (e.g., glyph position and escapement points, average escapement, etc.) scale uniformly in proportion to the body size of the font resource. For example, a distance that is defined as one-half the body size will be 5 mm at a font size of 10 mm and 50 mm at a font size of 100 mm. All scaling is performed with respect to the origin of the glyph coordinate system.

Anamorphic scaling, i.e., non-uniform scale factors in x and y , may be applied to a font resource according to the limits imposed by the minimum and maximum anamorphic scale factor modal properties (see MINANASCALE and MAXANASCALE, 8.7.1.15). In this case, the x and y components of positions and distances are scaled by their independent x, y scale factors, respectively. Let $S_{x,y}$ be the x and y components of the scale factor, $P_{x,y}$ and $D_{x,y}$ be the x and y components of a point and a distance in the glyph coordinate system, respectively; then the scaled point and distance can be represented by:

$$P'_{x,y} = S_{x,y} \times P_{x,y}$$

$$D'_{x,y} = S_{x,y} \times D_{x,y}$$

Where warranted, multiple font resource *masters* of a font design may be defined by a font supplier in order to more faithfully reproduce the size-dependent shape and possible metric variations inherent in certain typeface designs, through the appropriate application of the minimum, design and maximum font size description properties (see DSNSIZE, MINSIZE and MAXSIZE, 8.6.17). Each such font resource continues to follow the linear scaling model presented here over the continuous range of body sizes defined from MINSIZE, inclusive, to MAXSIZE, inclusive.

In general, non-linear scaling artifacts will be introduced from one font resource master to another. Creators of such font resources are strongly encouraged to incorporate some indication of the intended usage of a master in its font resource name, e.g., *Notes*, *Book*, *Display*, etc., to maintain an unambiguous font resource name space (see FONTNAME property, 8.5). Composition processes using such font resources are advised to treat each master as a logically distinct font resource, which although of the same font family, has independent metric and shape representation information.

8.4 Extensibility

As font resource interchange and processing evolves, new features will require new representations in ISO/IEC 9541. As ISO/IEC 9541 will be supported by current and future versions of multiple standards and products developed in conformance with those standards, the font resource architecture defined here is designed to support the reasonable extension of both ISO and non-ISO font resource information. Such extensions shall be made as amendments according to established ISO procedures.

Extensions to ISO/IEC 9541 shall be made in a way that is both forward and backward compatible with the current version of ISO/IEC 9541. An extension is backward compatible if and only if it can be shown that *robust* implementations conforming to an older version of ISO/IEC 9541 may process without modification font resources that conform to newer versions of ISO/IEC 9541. An extension is forward compatible if and only if it can be shown that any future *robust* implementation conforming to some future version of ISO/IEC 9541 will be able to process without modification font resources that conform to the existing version of ISO/IEC 9541.

In order to assure backward compatibility, future amendments to ISO/IEC 9541 shall be restricted to the addition of new or partially redundant properties rather than the semantic modification of existing properties. In such cases, the standard version information description property value shall be updated to reflect the amendment [see the standard version information property (STANDARDVERSION), 8.6.2]. Forward compatibility is assured by the property-list architecture described herein.

Consumers of font resources are advised to ignore non-ISO properties whose property name or data type is unknown or not locally supported, but are strongly encouraged to make such unaltered data available to third parties during general font resource interchange.

8.5 Specification of font resource name (FONTNAME)

FONTNAME is a structured-name, the device-independent name of the font resource, as assigned by the data source (DATASOURCE).

```
fontname-property ::= fontname-name, fontname-value
fontname-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//FONTNAME
fontname-value ::= STRUCTURED-NAME
```

NOTE 9 The FONTNAME property provides an unambiguous method for identifying a given font resource across space and time, within a potentially large decentralized database of the world's font resources.

8.6 Description of font resource description properties (FONTDESCRIPTION)

FONTDESCRIPTION is a property-list, specifying all the properties that globally describe the font resource, independent of a particular writing mode or how the glyph shapes may be represented.

```
fontdescription-property-list ::= fontdescription-name,
                                fontdescription-value-property-list
fontdescription-name ::= STRUCTURED-NAME
                    -- ISO/IEC 9541-1//FONTDESCRIPTION
fontdescription-value-property-list ::=
    (dataversion-property | standardversion-property |
     datasource-property | datacopyright-property |
     dsnsource-property | dsncopyright-property |
     relunits-property | typeface-property |
     fontfamily-property | posture-property |
     postureangle-property | weight-property |
     propwidth-property | structure-property |
     dsngroup-property | glyphcomp-property-list |
     dsnsize-property | minsize-property |
     maxsize-property | capheight-property |
     lcheight-property | minfeatsz-property |
     nomcapstemwidth-property | nomlcmstemwidth-property |
     nomwrmode-property | property-list) *
```

The remainder of this clause defines the ISO/IEC 9541 font resource description properties. The order of the description properties as shown here is for convenience only; no order is assumed.

8.6.1 Data Version (DATAVERSION)

DATAVERSION is an ordered-value-list of three values giving the version information for the font resource data. It is composed of two *cardinals*: the major and minor version number of the data, respectively, and an ISO 8824 Universal Time String, the timestamp of the last update to the data.

```
dataversion-property ::= dataversion-name, dataversion-value-value-list
dataversion-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//DATAVERSION
dataversion-value-value-list ::= dataversion-major,
                                dataversion-minor,
                                dataversion-timestamp

dataversion-major ::= CARDINAL
dataversion-minor ::= CARDINAL
dataversion-timestamp ::= -- ISO 8824 Universal Time String
```

8.6.2 Standard Version (*STANDARDVERSION*)

STANDARDVERSION is a cardinal giving the version information of ISO/IEC 9541 that the font resource structure conforms to, as assigned by ISO/IEC 9541-2. Typically, this value is defined to be the year that the standard or an amendment to the standard is published, e.g., 1991.

standardversion-property ::= standardversion-name, standardversion-value

standardversion-name ::= STRUCTURED-NAME

-- ISO/IEC 9541-1//STANDARDVERSION

standardversion-value ::= CARDINAL

8.6.3 Data Source (*DATASOURCE*)

DATASOURCE is a structured-name, the name of the supplier of the font resource data, or if different, the name of the organization that last modified the information contained in the font resource.

datasource-property ::= datasource-name, datasource-value

datasource-name ::= STRUCTURED-NAME

-- ISO/IEC 9541-1//DATASOURCE

datasource-value ::= STRUCTURED-NAME

8.6.4 Data Copyright (*DATACOPYRIGHT*)

DATACOPYRIGHT is a message, the copyright information of the legal owner of the digital font data as represented in the font resource.

datacopyright-property ::= datacopyright-name, datacopyright-value

datacopyright-name ::= STRUCTURED-NAME

-- ISO/IEC 9541-1//DATACOPYRIGHT

datacopyright-value ::= MESSAGE

NOTE 10 Data copyright information may be a required component of a font resource by law or contract, independent of the particular encoding or possible storage format used to represent that information.

8.6.5 Design Source (*DSNSOURCE*)

DSNSOURCE is a structured-name, the organizational name of the typeface design source.

dsnsource-property ::= dsnsource-name, dsnsource-value

dsnsource-name ::= STRUCTURED-NAME

-- ISO/IEC 9541-1//DSNSOURCE

dsnsource-value ::= STRUCTURED-NAME

8.6.6 Design Copyright (DSNCOPYRIGHT)

DSNCOPYRIGHT is a message, the copyright information of the legal owner of the typeface design as represented in the font resource.

```
dsncopyright-property ::= dsncopyright-name, dsncopyright-value
dsncopyright-name ::= STRUCTURED-NAME
                        -- ISO/IEC 9541-1//DSNCOPYRIGHT
dsncopyright-value ::= MESSAGE
```

NOTE 11 Typeface design and trademark protection laws vary from country to country. As with the data copyright (DATACOPYRIGHT), design copyright information may be a required component of a font resource by law or contract, independent of the particular encoding or possible storage format used to represent that information.

8.6.7 Relative Rational Units (RELUNITS)

RELUNITS is a cardinal, the number of relative units equal to the body size of the font resource, as measured along the *y* axis of the glyph coordinate system.

```
relunits-property ::= relunits-name, relunits-value
relunits-name ::= STRUCTURED-NAME
                -- ISO/IEC 9541-1//RELUNITS
relunits-value ::= CARDINAL
```

NOTE 12 If supplied in a font resource, the RELUNITS property gives the number of discrete glyph coordinate system units equal to the body size, which constitutes the denominator of those properties of the font resource with data type rel-rational. If not supplied, this implies a continuous unit coordinate space where all measurements are expressed as rational numbers; in this case most properties that use the rel-rational data type will supply both a numerator and denominator. ^[AC1]For font resource implementation consistency and for font reference comparison efficiency it is recommended that all font resources specify the Relative Rational Units, and use that specified value as the denominator for all Relative Rational values. For consistency with existing industry practice, it is recommended that a value of 1 000 be used for the Relative Rational Units. ^[AC1]

8.6.8 Typeface Name (TYPEFACE)

TYPEFACE is a message, the full name of the typeface design of the font resource.

```
typeface-property ::= typeface-name, typeface-value
typeface-name ::= STRUCTURED-NAME
                -- ISO/IEC 9541-1//TYPEFACE
typeface-value ::= MESSAGE
```

NOTE 13 The value for the TYPEFACE property is generally the industrial name of the typeface, as normally used in the type industry, and usually implies particular values for the font family name, weight, posture, proportionate width, etc. This name may or may not be unambiguous, but should be suitable for presentation to a human user to identify the typeface used in the font resource.

8.6.9 Font Family Name (FONTFAMILY)

FONTFAMILY is a match-string, the name of the font family of the font resource.

```
fontfamily-property ::= fontfamily-name, fontfamily-value
fontfamily-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//FONTFAMILY
fontfamily-value ::= MATCH-STRING
```

8.6.10 *Posture (POSTURE)*

POSTURE is a code, indicating the coded posture of the typeface of the font resource; one of

- 0 ⇒ not applicable;
- 1 ⇒ upright (e.g., Roman);
- 2 ⇒ oblique; upright design slanted in the direction of the nominal escapement with no design or form change;
- 3 ⇒ back slanted oblique; upright design slanted in the direction opposite of the nominal escapement with no design or form change;
- 4 ⇒ italic; slanted in the direction of the nominal escapement with change in design or form;
- 5 ⇒ back slanted italic; italic design slanted in the direction opposite to the nominal escapement;
- 6 ⇒ other.

All other posture codes are reserved for future standardization.

```
posture-property ::= posture-name, posture-value
posture-name ::= STRUCTURED-NAME
                -- ISO/IEC 9541-1//POSTURE
posture-value ::= CODE
```

8.6.11 *Posture Angle (POSTUREANGLE)*

POSTUREANGLE is an angle, the nominal angle of the posture of the typeface design.

```
postureangle-property ::= postureangle-name, postureangle-value
postureangle-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//POSTUREANGLE
postureangle-value ::= ANGLE
```

NOTE 14 The value for the POSTUREANGLE property will normally be defined in the first and second quadrants of the glyph coordinate system, in the range 75 to 105°. For Latin fonts, the italic and oblique postures usually will be less than 90°.

8.6.12 *Weight (WEIGHT)*

WEIGHT is a code, indicating the coded weight of the typeface of the font resource relative to all font resources of the same font family (FONTFAMILY) and data source (DATASOURCE), according to the judgment of the data source; one of

- 0 ⇒ not applicable
- 1 ⇒ ultra light (lowest ratio of glyph stem width to font height);
- 2 ⇒ extra light;
- 3 ⇒ light;
- 4 ⇒ semilight;
- 5 ⇒ medium;
- 6 ⇒ semi bold;
- 7 ⇒ bold;
- 8 ⇒ extra bold;
- 9 ⇒ ultra bold (highest ratio of glyph stem width to font height).

WEIGHT codes are ordered according to increasing weight. All other weight codes are reserved for future standardization.

weight-property ::= weight-name, weight-value
weight-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//WEIGHT
weight-value ::= CODE

NOTE 15 A font family-independent approximation of absolute weight adequate for matching operations across all font resources and all font suppliers can be derived using the nominal capital stem width (NOMCAPSTEMWIDTH) and capital height (CAPHEIGHT) properties:

$AbsoluteWeight = NOMCAPSTEMWIDTH / CAPHEIGHT$

8.6.13 Proportionate Width (*PROPWIDTH*)

PROPWIDTH is a code, indicating the coded proportionate width of the typeface of the font resource relative to all font resources of the same font family (FONTFAMILY) and data source (DATASOURCE), according to the judgment of the data source; one of

- 0 ⇒ not applicable;
- 1 ⇒ ultra condensed (lowest ratio of glyph width to font height);
- 2 ⇒ extra condensed;
- 3 ⇒ condensed;
- 4 ⇒ semi condensed;
- 5 ⇒ medium;
- 6 ⇒ semi expanded;
- 7 ⇒ expanded;
- 8 ⇒ extra expanded;
- 9 ⇒ ultra expanded (highest ratio of glyph width to font height).

PROPWIDTH codes are ordered according to increasing width. All other proportionate width codes are reserved for future standardization.

propwidth-property ::= propwidth-name, propwidth-value
propwidth-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//PROPWIDTH
propwidth-value ::= CODE

NOTE 16 A font family-independent approximation of absolute proportionate width adequate for matching operations across all font resources and all font suppliers can be derived using the average capital escapement (AVGCAPESCX or AVGCAPESCY) and capital height (CAPHEIGHT) properties:

$AbsolutePropwidth = AVGCAPESC[X \text{ or } Y] / CAPHEIGHT$

8.6.14 Structure (*STRUCTURE*)

STRUCTURE is a code, indicating the structure of the strokes of the glyph shapes of the font resource, one of

- 0 ⇒ undefined or not applicable;
- 1 ⇒ solid, the shape containing no voids or patterns within the strokes;
- 2 ⇒ outline, the shape including only the outer edges of the strokes.

All other structure codes are reserved for future standardization.

```
structure-property ::= structure-name, structure-value
structure-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//STRUCTURE
structure-value ::= CODE
```

NOTE 17 Structure codes are not intended to supplant the design grouping provided by the design group property (DSNGROUP).

8.6.15 Design Group (DSNGROUP)

DSNGROUP is an ordered-value-list of three codes, indicating the design grouping of the typeface of the font resource, according to one or more levels of the grouping scheme defined in ISO/IEC 9541-1, Annex A, in order by level, beginning with the highest, most general level.

All other design group codes are reserved for future standardization.

```
dsngroup-property ::= dsngroup-name, dsngroup-value-value-list
dsngroup-name ::= STRUCTURED-NAME
                -- ISO/IEC 9541-1//DSNGROUP
dsngroup-value-value-list ::= dsngroup-class, dsngroup-subclass,
                             dsngroup-specific-group
dsngroup-class ::= CODE
dsngroup-subclass ::= CODE
dsngroup-specific-group ::= CODE
```

NOTE 18 The WEIGHT, PROPWIDTH, POSTURE and STRUCTURE properties specify further typographic design variations on elements of the design group, e.g., *Baskerville Roman*, *Baskerville Bold Italic*, *Baskerville Expanded Outline*, etc.

8.6.16 Glyph Complement (GLYPHCOMP)

GLYPHCOMP is an ordered-property-list, a list of properties that together define the union of distinct glyph identifiers contained in each writing mode of the font resource.

The properties include any or all of the properties defined in this clause, at most once each, and applied in the order here defined so as to construct a specification of the glyph complement.

```
glyphcomp-property-list ::= glyphcomp-name,
                             glyphcomp-value-property-list
glyphcomp-name ::= STRUCTURED-NAME
                -- ISO/IEC 9541-1//GLYPHCOMP
glyphcomp-value-property-list ::=
    [numglyphs-property,]
    [incglyphcols-property,]
    [excglyphcols-property,]
    [incglyphs-property,]
    [excglyphs-property,]
    [property-list]
```

NOTE 19 individual writing modes may contain glyph metrics for fewer glyphs than prescribed by the full glyph complement.

8.6.16.1 *Number of Glyphs (NUMGLYPHS)*

NUMGLYPHS is a cardinal, the number of distinct glyph identifiers in the glyph complement of the font resource.

numglyphs-property ::= numglyphs-name, numglyphs-value
numglyphs-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//NUMGLYPHS
numglyphs-value ::= CARDINAL

8.6.16.2 *Included Glyph Collections (INCGLYPHCOLS)*

INCGLYPHCOLS is a value-list of structured glyph collection names, the glyphs in the collections thereby indicated to be included in the glyph complement, subject to modification by the presence of other glyph complement properties (see clause 7 for a description of glyph collections).

incglyphcols-property ::= incglyphcols-name, incglyphcols-value-value-list
incglyphcols-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//INCGLYPHCOLS
incglyphcols-value-value-list ::= (glyph-collection-name) +
glyph-collection-name ::= STRUCTURED-NAME

8.6.16.3 *Excluded Glyph Collections (EXCGLYPHCOLS)*

EXCGLYPHCOLS is a value-list of structured glyph collection names, the glyphs in the collections thereby indicated to be excluded from the glyph complement.

excglyphcols-property ::= excglyphcols-name, excglyphcols-value-value-list
excglyphcols-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//EXCGLYPHCOLS
excglyphcols-value-value-list ::= (glyph-collection-name) +

8.6.16.4 *Included Glyphs (INCGLYPHS)*

INCGLYPHS is a value-list of structured glyph names, thereby indicated to be included in the glyph complement, subject to modification by the presence of other glyph complement properties.

incglyphs-property ::= incglyphs-name, incglyphs-value-value-list
incglyphs-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//INCGLYPHS
incglyphs-value-value-list ::= (glyph-name) +
glyph-name ::= STRUCTURED-NAME

8.6.16.5 *Excluded Glyphs (EXCGLYPHS)*

EXCGLYPHS is a value-list of structured glyph names, thereby indicated to be excluded from the glyph complement.

excglyphs-property ::= excglyphs-name, excglyphs-value-value-list
excglyphs-name ::= STRUCTURED-NAME
-- ISO/IEC 9541-1//EXCGLYPHS
excglyphs-value-value-list ::= (glyph-name) +

8.6.17 Design Size, Recommended Minimum and Maximum Size (DSNSIZE, MINSIZE, MAXSIZE)

DSNSIZE is a rational, the recommended body size at which the font resource is designed to be used, in units of millimeters, according to the judgment of the design source (DSNSOURCE). The value of this property also establishes a default body size at which the font resource is to be used if no other size is specified in a font reference.

MINSIZE and MAXSIZE are *rational*s, the recommended minimum and maximum of the range of body sizes over which the font resource is designed to be linearly scaled, each size specified in units of millimeters, according to the judgment of the design source (DSNSOURCE). If both minimum and maximum sizes are the same as the design size, the font resource is designed to be used only at that one size.

In effect, the use of the DSNSIZE, MINSIZE, and MAXSIZE properties allow for the definition of multiple font masters for typeface designs that require this level of typographic specification.

```
dsnsiz-property ::= dsnsiz-name, dsnsiz-value
dsnsiz-name ::= STRUCTURED-NAME
               -- ISO/IEC 9541-1//DSNSIZE
dsnsiz-value ::= RATIONAL
minsiz-property ::= minsiz-name, minsiz-value
minsiz-name ::= STRUCTURED-NAME
               -- ISO/IEC 9541-1//MINSIZE
minsiz-value ::= RATIONAL
maxsiz-property ::= maxsiz-name, maxsiz-value
maxsiz-name ::= STRUCTURED-NAME
               -- ISO/IEC 9541-1//MAXSIZE
maxsiz-value ::= RATIONAL
```

NOTE 20 The size at which the font resource will actually be used and imaged is usually determined, not directly by the font resource, but by the presentation device imaging the font resource, acting under direct or indirect control of the end user, e.g., as specified via the content of a document.

8.6.18 Capital Height (CAPHEIGHT)

CAPHEIGHT is an unsigned rel-rational, the nominal height of the capital (major) glyphs contained in the font resource, as specified by the data source (DATASOURCE). Where applicable, defined to be the nominal height of the capital letter “X” (Latin, Greek, Cyrillic, etc.).

```
capheight-property ::= capheight-name, capheight-value
capheight-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//CAPHEIGHT
capheight-value ::= REL-RATIONAL -- unsigned
```

8.6.19 Lowercase Height (LCHEIGHT)

LCHEIGHT is an unsigned rel-rational, the nominal height of the lowercase (mean) glyphs contained in the font resource, as specified by the data source (DATASOURCE). Where applicable, defined to be the nominal height of the lowercase letter “x” (Latin, Cyrillic, etc.).

```
lcheight-property ::= lcheight-name, lcheight-value
lcheight-name ::= STRUCTURED-NAME
                 -- ISO/IEC 9541-1//LCHEIGHT
lcheight-value ::= REL-RATIONAL -- unsigned
```

NOTE 21 This property is defined to be equivalent to the capital height (CAPHEIGHT) for font resources which contain no lowercase glyphs (e.g., Ideographic, Hebrew, etc.).

8.6.20 *Minimum Feature Size (MINFEATSZ)*

MINFEATSZ is an unsigned rel-rational, the size of the smallest non-terminating feature in the glyph shapes of the font resource.

```
minfeatsz-property := minfeatsz-name, minfeatsz-value
minfeatsz-name := STRUCTURED-NAME
                  -- ISO/IEC 9541-1//MINFEATSZ
minfeatsz-value := REL-RATIONAL -- unsigned
```

NOTE 22 MINFEATSZ might be the thickness of a stroke, or of a serif if present.

8.6.21 *Nominal Capital Stem Width (NOMCAPSTEMWIDTH)*

NOMCAPSTEMWIDTH is an unsigned rel-rational, the nominal width of the main stems of the capital (major) glyphs contained in the font resource, measured perpendicular to the posture angle (POSTUREANGLE), as specified by the data source (DATASOURCE). Where applicable, defined to be the nominal stem width of the Latin capital letter “T”.

```
nomcapstemwidth-property := nomcapstemwidth-name,
nomcapstemwidth-value
nomcapstemwidth-name := STRUCTURED-NAME
                      -- ISO/IEC 9541-1//NOMCAPSTEMWIDTH
nomcapstemwidth-value := REL-RATIONAL -- unsigned
```

8.6.22 *Nominal Lowercase Stem Width (NOMLCSTEMWIDTH)*

NOMLCSTEMWIDTH is an unsigned rel-rational, the nominal width of the main stems of the lowercase (mean) glyphs contained in the font resource, measured perpendicular to the posture angle (POSTUREANGLE), as specified by the data source (DATASOURCE). Where applicable, defined to be the nominal stem width of the Latin lowercase letter “t”.

```
nomlcstemwidth-property := nomlcstemwidth-name,
nomlcstemwidth-value
nomlcstemwidth-name := STRUCTURED-NAME
                    -- ISO/IEC 9541-1//NOMLCSTEMWIDTH
nomlcstemwidth-value := REL-RATIONAL -- unsigned
```

NOTE 23 this property is defined to be equivalent to the nominal capital stem width (NOMCAPSTEMWIDTH) for font resources which contain no lowercase glyphs (e.g., Ideographic, Hebrew, etc.).

8.6.23 *Nominal Writing Mode (NOMWRMODE)*

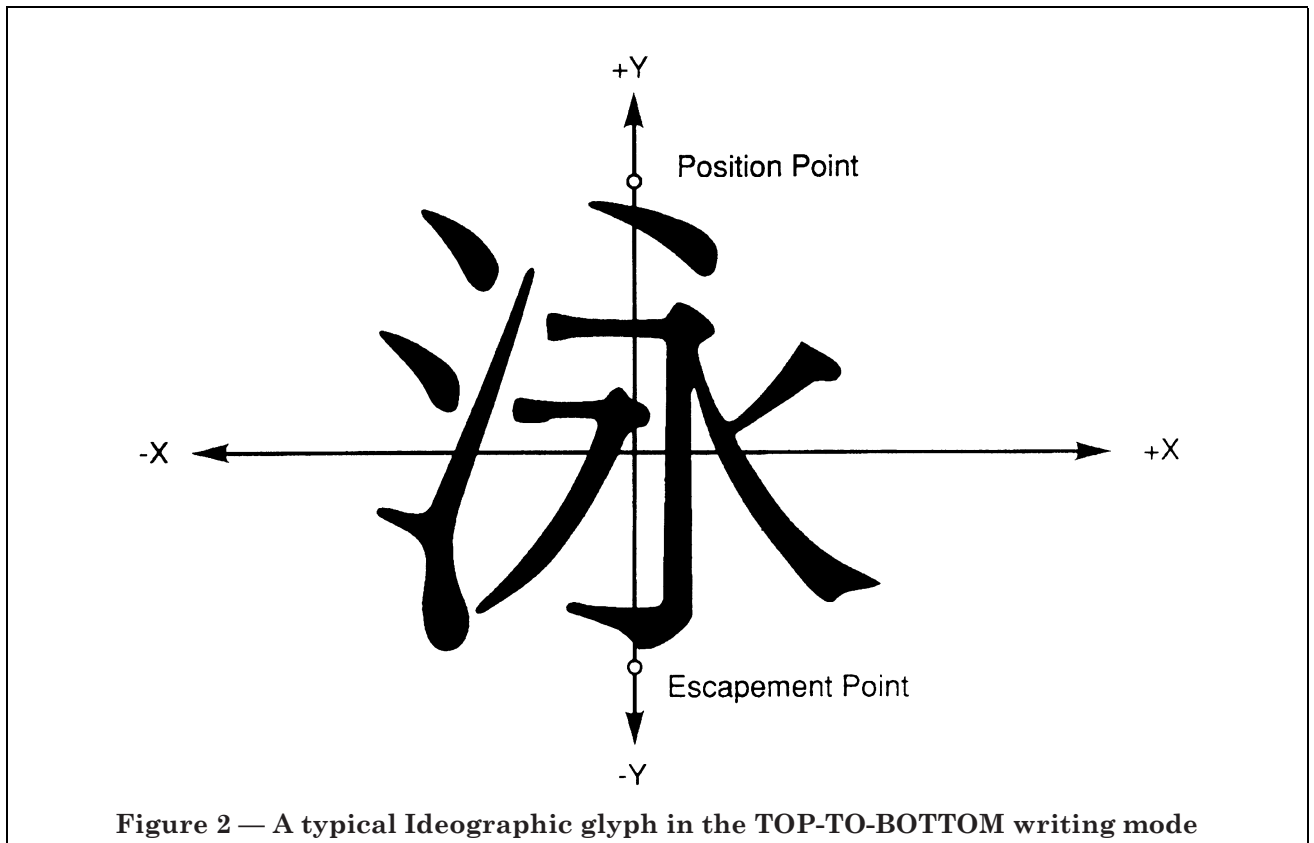
NOMWRMODE is a structured-name, the name of the nominal writing mode, i.e., the mode in which the font resource is to be used if no other mode is specified in a font reference, one of those writing modes defined in the writing mode name property (WRMODENAME).

```
nomwrmode-property := nomwrmode-name, nomwrmode-value
nomwrmode-name := STRUCTURED-NAME
                -- ISO/IEC 9541-1//NOMWRMODE
nomwrmode-value := STRUCTURED-NAME
```

8.7 Specification of font resource modal properties (WRMODES)

The values of certain font resource properties depend upon the writing mode in which they are nested; this dependence is established to allow the remainder of the font resource information, particularly the glyph shape representations, to be used in multiple modes.

Each writing mode is identified by a structured writing mode name; each mode is associated with the setting of text in a writing system, usually corresponding to a nominal escapement direction of the font in that mode, the direction specified within the glyph coordinate system. Examples of such modes might include left-to-right, top-to-bottom, right-to-left, etc. Refer to Figure 1, Figure 2, and Figure 3.



WRMODES is a property-list of writing mode *property-list*, defining all writing mode properties associated with this font resource.

```

wrmodes-property-list ::= wrmodes-name, wrmodes-value-property-list
wrmodes-name ::= STRUCTURED-NAME
                  -- ISO/IEC 9541-1//WRMODES
wrmodes-value-property-list ::= (wrmode-property-list | property-list) *
```